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(71)Applicant : ASAHI GLASS CO LTD

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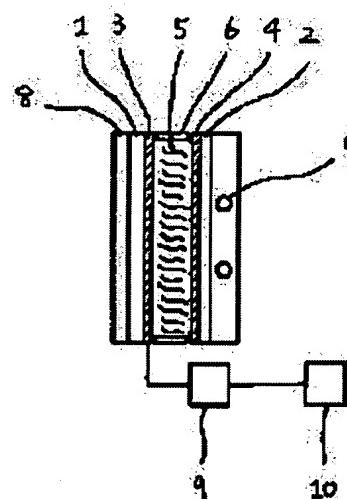
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(54) LIQUID CRYSTAL DISPLAY ELEMENT

(57)Abstract:

PURPOSE: To transmit and receive necessary data from the display of a computer by using the transparent electrode of a glass substrate with the transparent electrode for the liquid crystal display element as an antenna for radio communication.

CONSTITUTION: Glass substrates 1 and 2 are arranged having their surfaces, where conductive films 3 and 4 are formed, opposite each other and liquid crystal 5 is sandwiched between them. When the conductive films 3 and 4 are set opposite each other, 480×604 matrix patterns are formed as electrodes for driving the liquid crystal and a specific driving voltage is selectively applied to the matrix electrodes. Further, an impedance matching circuit element 9 is coupled with the conductive film 3 for operation as the antenna for radio communication, and the impedance matching circuit element 9 is connected to the computer 10 in which a radio transmitter is incorporated.



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CLAIMS

[Claim(s)]

[Claim 1] Prepare the electric conduction film of the predetermined pattern which has translucency in a glass substrate, make this glass substrate into a pair, and each this electric conduction film surface side is made to counter. Moreover, in order that an electro-optics medium may be made to pinch between these glass substrates and this electric conduction film may use this electric conduction film as the transmitting antenna or receiving antenna for radio in the liquid crystal display component used as an electrode for making liquid crystal drive. The liquid crystal display component characterized by combining the impedance matching circuit for antennas with this electric conduction film.

[Claim 2] The liquid crystal display component according to claim 1 characterized by forming the impedance matching circuit for antennas on a glass substrate.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the liquid crystal display equipment which can perform radio.

[0002]

[Description of the Prior Art] Conventionally, the convenience of a personal computer is pursued and the miniaturization of a computer is proposed briskly. Especially for miniaturizing a computer even in portable, many liquid crystal display components are used as a display for operating a computer. Moreover, in order to make the output record of the count result performed by computer carry out outside, it is necessary to connect a computer and a printing equipment by the exclusive predetermined cable. In order to make one set of a printing equipment share by two or more computers in recent years, transmitting a predetermined signal to a printing equipment from a computer by radio, without using said exclusive cable is proposed.

[0003] The conceptual diagram which connects a computer and a printing equipment by radio is drawing 2 . 21 is the personal computer together put considering the liquid crystal display component as a display here, and 23 is a printing equipment for making the output record of the count result of a computer carry out outside. The transmitter 22 is connected to the computer 21 by the predetermined cable, and the receiver 24 is connected to the printing equipment 23 by the predetermined cable. Here, as for transmit frequencies, UHF bands, such as a 400MHz band of specific smallness power, are mainly used.

[0004] Even if a computer is miniaturized as it is such a configuration, a transmitter must be connected to a computer, and operability and workspace increase. Moreover, separately, the power source of a transmitter is also required and lacks in portability.

[0005]

[Problem(s) to be Solved by the Invention] This invention offers newly the liquid crystal display component for radio which was not conventionally known for the purpose of canceling the above-mentioned fault which the conventional technique has.

[0006]

[Means for Solving the Problem] This invention is made that the above-mentioned technical problem should be solved, and the electric conduction film of the predetermined pattern which has translucency in a glass substrate is prepared. In the liquid crystal display component used as an electrode to make this glass substrate into a pair, and make each this electric conduction film surface side counter, and make an electro-optics medium pinch between these glass substrates, and for this electric conduction film make liquid crystal drive In order to use this electric conduction film as the transmitting antenna or receiving antenna for radio, the liquid crystal display component characterized by combining the impedance matching circuit for antennas with this electric conduction film is offered. Moreover, the aforementioned liquid crystal display component characterized by forming the impedance matching circuit for antennas on a glass substrate is offered.

[0007]

[Example] Drawing 1 is the sectional view of the liquid crystal display component for radio of an example. They are a glass substrate with a thickness of about 1mm and the electric conduction film

which has the translucency by which 1 and 2 were formed in three and four were formed on a glass substrate 1 and 2, respectively. Glass substrates 1 and 2 make the field in which each electric conduction film is formed counter, and in the meantime is making the electro-optics medium (liquid crystal) 5 pinch. 6 is the adhesives for making it liquid crystal not leak from a glass substrate. The back light of the liquid crystal with which 7 consists of a cold cathode discharge tube or the hot cathode discharge tube, and 8 are polarizing plates.

[0008] If the electric conduction film 3 and 4 goes mutually, it will be arranged so that the matrix pattern of 480x640 may be formed as an electrode for a drive of liquid crystal, and predetermined driver voltage will be alternatively impressed to this matrix-like electrode. The electric conduction film 3 divides a horizontal direction with 640 as pinstripes, and the electric conduction film 4 is dividing the perpendicular direction with 480 as a disk, respectively. Then, in order to make it act on the electric conduction film 3 also as an antenna for radio, the impedance matching circuit element 9 is combined, and the impedance matching circuit element 9 is connected with the computer 10 having a radio transmitter.

[0009] The configuration of the impedance matching circuit element 9 is an RLC circuit which consists of resistance (R), a coil (L), and a capacitor (C), and specifically constituted the predetermined circuit that this electric conduction film should be made 40ohm-80ohm in this example. It is the series resonant circuit and ***** which mainly inserted the inductance in the matching circuit for making antenna length into quarter-wave length since an operating frequency was made into 430MHz bands and the die length of the electric conduction film 3 as an antenna was about 15cm.

[0010] Moreover, it is also possible to prepare a predetermined touch-down conductor layer in the opposed face in which the electric conduction film of a glass substrate is not formed as an RLC circuit, and to form an RLC circuit in a glass substrate by the direct microstrip circuit.

[0011] Since the electric conduction film needed translucency, it was formed by the ITO (indium oxide tin) film. the electric resistance value in one each of the electric conduction film -- about 1Kohm- dozens -- it can consider that an electric resistance value is the divisor of 10 ohms by connecting each electric conduction film with K ohms in juxtaposition, although it is high, and it becomes possible to achieve the operation as an antenna. Moreover, the electric conduction film is SnO₂ besides ITO. You may be the ingredient which has membranous translucency.

[0012]

[Effect of the Invention] According to this invention, transmission and reception of directly required data are attained from the display of a computer by using the transparent electrode of the glass substrate with a transparent electrode for liquid crystal display components as the antenna for radio.

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PRIOR ART

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The sectional view of the liquid crystal display component for radio of an example

[Drawing 2] The conceptual diagram by the conventional radio

[Description of Notations]

1 2: Glass substrate

3 4: Electric conduction film

5: Electro-optics medium (liquid crystal)

9: Impedance matching circuit element

10: Computer

21: Personal computer

22: Transmitter

23: Printing equipment

24: Receiver

[Translation done.]

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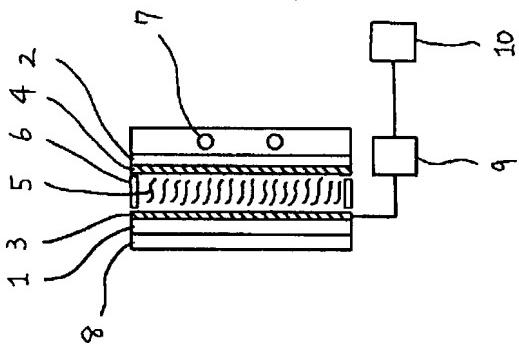
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(54)【発明の名称】 液晶表示素子

(57)【要約】

【目的】液晶表示素子用の透明電極付きガラス基板の透明電極を無線通信用のアンテナとすることで、コンピューターのディスプレイから直接必要なデータを送受信可能とする。

【構成】ガラス基板1、2は各々の導電膜3、4が形成されている面を対向させ、その間には液晶5を挟持させている。導電膜3、4は互いに向い合せると液晶の駆動用電極として 480×640 のマトリックス状電極には選択的に所定の駆動電圧が印加される。また、導電膜3には無線通信用のアンテナとしても作用させるためにインピーダンス整合回路素子9が結合されており、インピーダンス整合回路素子9は無線送信機を内蔵したコンピューター10と接続している。



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【特許請求の範囲】

【請求項1】ガラス基板に透光性を有する所定パターンの導電膜を設け、該ガラス基板を一対にして各々の該導電膜面側を対向させ、また該ガラス基板の間に電気光学媒体を挟持させ、該導電膜は液晶を駆動させるための電極として用いた液晶表示素子において、該導電膜を無線通信用の送信アンテナ或いは受信アンテナとして利用するために、該導電膜にアンテナ用のインピーダンス整合回路を結合したことを特徴とする液晶表示素子。

【請求項2】ガラス基板上にアンテナ用のインピーダンス整合回路を形成したことを特徴とする請求項1記載の液晶表示素子。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、無線通信を行なうことのできる液晶ディスプレイ装置に関するものである。

【0002】

【従来の技術】従来、パーソナルコンピューターの利便性を追求し、コンピューターの小型化が盛んに提案されている。特にコンピューターを携帯用にまで小型化するにはコンピューターを操作するためのディスプレイとして、液晶表示素子が多く用いられている。また、コンピューターによって実行された計算結果等を外部に出力記録するためにはコンピューターとプリント装置とを所定の専用ケーブルにて接続する必要がある。近年、一台のプリント装置を複数台のコンピューターにて共用するために前記専用ケーブルを用いずに無線通信によって所定の信号をコンピューターからプリント装置へ送信することが提案されている。

【0003】コンピューターとプリント装置とを無線通信で接続する概念図が図2である。ここで、21は液晶表示素子をディスプレイとして組み合わされたパーソナルコンピューターであり、23はコンピューターの計算結果を外部に出力記録するためのプリント装置である。コンピューター21には送信機22が所定のケーブルで接続されていて、またプリント装置23には受信機24が所定のケーブルで接続されている。ここで、送信周波数は特定小電力の400MHz帯等のUHF帯域がおもに用いられている。

【0004】このような構成であると、コンピューターが小型化してもコンピューターに送信機を接続しなければならず、操作性や作業スペースが多くなる。また、送信機の電源が別途必要でもあり、携帯性に欠ける。

【0005】

【発明が解決しようとする課題】本発明は、従来技術の有する前述の欠点を解消することを目的とし、従来知られていないかった無線通信用液晶表示素子を新規に提供するものである。

【0006】

【課題を解決するための手段】本発明は前述の課題を解

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決すべくなされたものであり、ガラス基板に透光性を有する所定パターンの導電膜を設け、該ガラス基板を一対にして各々の該導電膜面側を対向させ、また該ガラス基板の間に電気光学媒体を挟持させ、該導電膜は液晶を駆動させるための電極として用いた液晶表示素子において、該導電膜を無線通信用の送信アンテナ或いは受信アンテナとして利用するために、該導電膜にアンテナ用のインピーダンス整合回路を結合したことを特徴とする液晶表示素子を提供するものである。また、ガラス基板上にアンテナ用のインピーダンス整合回路を形成したことを特徴とする前記の液晶表示素子を提供するものである。

【0007】

【実施例】図1は、実施例の無線通信用液晶表示素子の断面図である。1、2は厚さ約1mmのガラス基板、3、4はそれぞれガラス基板1、2上に形成された透光性を有する導電膜である。ガラス基板1、2は各々の導電膜が形成されている面を対向させ、その間には電気光学媒体（液晶）5を挟持させている。6は液晶がガラス基板から漏れないようにするための接着剤である。7は冷陰極放電管もしくは熱陰極放電管からなる液晶のパックライト、8は偏光板である。

【0008】導電膜3、4は互いに向い合せると液晶の駆動用電極として480×640のマトリックスパターンが形成されるように配列されていて、該マトリックス状電極には選択的に所定の駆動電圧が印加される。導電膜3は縦縞として640本有り水平方向を分割し、導電膜4は横縞として480本有り垂直方向をそれぞれ分割している。そこで、導電膜3には無線通信用のアンテナとしても作用させるためにインピーダンス整合回路素子9が結合されており、インピーダンス整合回路素子9は無線送信機を内蔵したコンピューター10と接続している。

【0009】インピーダンス整合回路素子9の構成は具体的には抵抗（R）、コイル（L）、コンデンサー（C）とから成るRLC回路であり、本実施例においては該導電膜を40Ω～80Ωにすべく所定の回路を構成した。使用周波数は430MHz帯域用とし、アンテナとしての導電膜3の長さは約15cmであるため、アンテナ長を1/4波長にするには整合回路において主にインダクタンスを挿入した直列共振回路となっている。

【0010】また、RLC回路としては、ガラス基板の導電膜が形成されていない対向面に所定の接地導体層を設けてガラス基板に直接マイクロストリップ回路によってRLC回路を形成することも可能である。

【0011】導電膜は透光性を必要とするため、ITO（酸化インジウム錫）膜で形成した。導電膜の各々一本における電気抵抗値は約1KΩ～数十KΩと高いが、各々の導電膜を並列的に接続することで電気抵抗値は約数十Ωとみなせ、アンテナとしての作用を果すことが可能

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となる。また、導電膜はITO以外にもSnO₂膜等の透光性を有する材料であってもよい。

【0012】

【発明の効果】本発明によれば、液晶表示素子用の透明電極付きガラス基板の透明電極を無線通信用のアンテナとしてことで、コンピューターのディスプレイから直接必要なデーターが送受信可能となる。

【図面の簡単な説明】

【図1】実施例の無線通信用液晶表示素子の断面図

【図2】従来の無線通信による概念図

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【符号の説明】

1、2：ガラス基板

3、4：導電膜

5：電気光学媒体（液晶）

9：インピーダンス整合回路素子

10：コンピューター

21：パーソナルコンピューター

22：送信機

23：プリント装置

10 24：受信機

